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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,336	06/19/2006	Tetsuo Sakurai	Q79212	9728
23373 7590 02/01/2008 SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			EXAMINER TRAN, TRANG Q	
			ART UNIT 2811	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/583,336	Applicant(s) SAKURAI, TETSUO	
	Examiner TRAN Q. TRAN	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 June 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) 9 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>06/19/2006</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Election/Restrictions***

Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-8, drawn to a Group III nitride semiconductor device.

Group II, claim(s) 9-10, drawn to a method for producing a Group III nitride semiconductor device.

In accordance with 37 CFR § 1.475, a national stage application shall relate to one invention only or to a group of inventions so linked as to form a single general inventive concept ("requirement of unity of invention"). When a group of inventions is claimed in an application, the requirement of unity of invention shall be fulfilled only when there is a technical relationship among those inventions involving one or more of the same or corresponding special technical features. The expression "special technical features" is defined as meaning those technical features that define the contribution which each claimed invention, considered as a whole, makes over the prior art. In the instant case, the technical relationship among the inventions is the technical feature of nitridizing the fine particles in the atmosphere containing a nitrogen source. This technical feature is generally known by one of ordinary skill in the art as a method for making a Group II nitride semiconductor device, and therefore is not a special technical feature.

The inventions of Group I lack unity of invention with Group II because they are not linked by a technical feature that is a special technical feature and thereby do not relate to a single general inventive concept under PCT Rule 13.1. Under PCT 13.2, they lack having the same or corresponding special technical features since the technical relationship is not a technical feature that is a contribution over the prior art.

During a telephone conversation with Abraham J. Rosner on January 23, 2008 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-8. Affirmation of this election must be made by applicant in replying to this Office action. Claims 9-10 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1-2, 4 and 7-8** are rejected under 35 U.S.C. 102(b) as being anticipated by Urashima et al. (US PGPub 2002/0155712).

**Re. claim 1**, Fig. 1 and 6 of Urashima discloses a Group III nitride semiconductor device comprising a substrate (11), and a plurality of Group III nitride semiconductor layers (12, 13, 14) provided on the substrate (11), wherein a first layer (12) which is in contact with the substrate (11) is composed of silicon-doped  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 \leq x \leq 1$ ) (¶ 153

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discloses the layer (12) is GaN which has  $x = 0$  and doped with Silicon)

**Re. claim 2**, Urashima discloses the Group III nitride semiconductor device according to claim 1, wherein the first layer contains silicon in an amount of  $1 \times 10^{17}/\text{cm}^3$  (¶ 153).

**Re. claim 4**, Fig. 6 of Urashima contains Fig. 1(d) that discloses the Group III nitride semiconductor device according to claim 1, wherein the first layer has a structure formed of aggregated columnar crystal grains.

**Re. claim 7**, Fig. 6 of Urashima discloses a Group III nitride semiconductor light-emitting device comprising a substrate (11); an n-type layer (14), a light-emitting layer (15 and 16), and a p-type layer (18), which are composed of a Group III nitride semiconductor single crystal (12) and are provided on the substrate (11) in this order; a negative electrode (¶ 168) provided on the n-type layer (12); and a positive electrode (¶ 168) provided on the p-type layer (18), wherein there is a layer composed of silicon-doped  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 \leq x \leq 1$ ) (¶ 153 discloses the layer (12) is GaN which has  $x = 0$  and doped with Silicon) in contact with the substrate (11).

**Re. claim 8**, Fig. 6 of Urashima contains Fig. 1(d) that discloses the Group III nitride semiconductor light-emitting device according to claim 7, wherein the silicon-

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doped  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 \leq x \leq 1$ ) layer (12) has a structure formed of aggregated columnar crystal grains.

**Claims 3** is rejected under 35 U.S.C. 102(b) as being anticipated by Ishibashi et al. (6,165,812).

**Re. claim 3**, Fig. 5, 6 and 11 of Ishibashi discloses a Group III nitride semiconductor device comprising a substrate (10), and a plurality of Group III nitride semiconductor layers (10, 211 (as 11)), 12) provided on the substrate (10), wherein a first layer (211a) which is in contact with the substrate (10) is composed of  $\text{AlN}$  (which is  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $x=1$ )), and the difference in height between a protrusion and a depression which are present at the interface between the first layer (11) and a second layer (top of 11c) provided thereon is 10 nm or more (Fig. 7 shows the surface roughness is closed to 100 angstroms (10nm)) and is equal to, or less than, 99% the thickness of the first layer (211a) (thickness of 211a (50nm) + the surface roughness (10nm) = 60 nm =>  $(10/60) \times 100$  is less than 99%).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 5-6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Urashima in view of Udagawa (JP 08282524).

**Re. claim 5**, Urashima differs from the claimed invention in not explicitly teaching the Group III nitride semiconductor device according to claim 4, wherein each of the columnar crystal grains has a width of 10 to 100 nm.

Udagawa teaches the width of the buffer layer (AlGa<sub>N</sub>) can be changed (§ 13).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the width of the buffer layer in Urashima that can be changed as in Udagawa, in order to achieve the functionality of the device.

**Re. claim 6**, Urashima differs from the claimed invention in not explicitly teaching the Group III nitride semiconductor device according to claim 1, wherein the first layer has a thickness of 20 nm to 200 nm.

Udagawa teaches the thickness of the conventional amorphous buffer layer (AlGa<sub>N</sub>) as the first layer is from 10 nm to 50nm.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the thickness of the buffer layer in Urashima from 10nm to 50nm as in Udagawa, in order to achieve the functionality of the device.


### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TRAN Q. TRAN whose telephone number is (571)270-3259. The examiner can normally be reached on Mon - Thu (9am-5pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne A. Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Trang Q Tran/  
Examiner, Art Unit 2811

  
**CUONG NGUYEN**  
**PRIMARY EXAMINER**